



## Course Syllabus: Advanced Inorganic Chemistry II - ChemS 350

<b>Division</b>	Physical Science and Engineering Division
<b>Course Number</b>	ChemS 350
<b>Course Title</b>	Advanced Inorganic Chemistry II
<b>Academic Semester</b>	Spring
<b>Academic Year</b>	2016/2017
<b>Semester Start Date</b>	01/22/2017
<b>Semester End Date</b>	05/18/2017
<b>Class Schedule</b> (Days & Time)	09:00 AM - 10:30 AM   Sun Wed

Instructor(s)				
Name	Email	Phone	Office Location	Office Hours
Jean-Marie Maurice Basset	jeanmarie.basset@kaust.edu.sa	+966128080299	4234, 3, Ibn Sina (bldg. 3)	<p>In the office every weekday from 9 to 12 and 2 to 6 pm</p> <p>Any appointment needed please contact my secretary: Nathalie Gregoire 012/8080763 or mail: <a href="mailto:nathalie.gregoire@kaust.edu.sa">nathalie.gregoire@kaust.edu.sa</a></p> <p><b>Jean-Marie Basset</b> Director of KAUST CATALYSIS CENTER (KCC) Distinguished Professor of Chemical Sciences KAUST Catalysis Research Center (KCC) King Abdullah University of Science and Technology Bld. 3, level 4, r-4234, PO Box 4700, Thuwal, 23955-6900, KSA</p>

Teaching Assistant(s)	
Name	Email

Course Information

<b>Comprehensive Course Description</b>	<ol style="list-style-type: none"> <li>1. <b>General Objectives of the course</b></li> <li>2. 18 electrons rule, pi bonding</li> <li>3. Sigma bonding</li> <li>4. Organometallic chemistry and catalysis: Ligands</li> <li>5. Elementary steps in catalysis: oxidative addition/reductive elimination</li> <li>6. Elementary steps in catalysis : sigma bond metathesis</li> <li>7. Elementary steps in catalysis: Insertions reactions, beta elimination</li> <li>8. Short introduction to catalytic cycle</li> <li>9. Homogeneous catalysis: Carbonylation</li> <li>10. Homogeneous catalysis : Hydroformylation</li> <li>11. Homogeneous catalysis: Monoelectronic transfer</li> <li>12. Polymerization: olefins, dienes,...</li> <li>13. Heterogeneous catalysis: the various classes of catalysts</li> <li>14. Heterogeneous catalysis: the flue gas depollution</li> <li>15. Heterogeneous Catalysis: Energy and CO<sub>2</sub></li> <li>16. Heterogeneous Catalysis: Deactivation and regeneration</li> <li>17. Heterogeneous catalysis: Refining technology</li> </ol>
<b>Course Description from Program Guide</b>	Emphasis on concepts and applications of homogenous and heterogeneous catalysis and the impact of such processes on the advancement of different industries.
<b>Goals and Objectives</b>	UNDERSTAND HOMOGENEOUS AND HETEROGENEOUS CATALYSIS FROM A MECHANISTIC STAND POINT OF VIEW IN PRINCIPLE AT THE END OF THIS COURSE THE STUDENTS ARE ABLE TO TAKLE ANY CHEMICAL REACTION.
<b>Required Knowledge</b>	BASIC KNOWLEDGE OF CHEMICAL BONDING
<b>Reference Texts</b>	<p><u>Books:</u></p> <p>1. <a href="#">James P. Collman</a> (Author), <a href="#">Richard G. Finke</a> (Author), <a href="#">Jack R. Norton</a> (Author) Principles and Applications of Organotransition Metal Chemistry [James P. <b>Collman</b>, Richard G. Finke, Jack R. Norton] on Amazon.com.(1987)</p> <p>-<b>Elschenbroich &amp; A. salzer « Organometallics » Iled, VCH 1992</b></p> <p>-<b>Gadi Rothenberg « Catalysis », VCH (2008)</b></p> <p>-<b>Piet W. N.M. Van Leeuwen « Homogeneous Catalysis », Kluwer (2004)</b></p> <p>-<b>Hans Niemanstvedriet, “Spectroscopy in Catalysis” Wiley –VCH (2007)</b></p> <p><u>Journals:</u></p> <ol style="list-style-type: none"> <li>1. Journal of Organometallic Chemistry</li> <li>2. Journal of Catalysis</li> <li>3. Organometallics</li> <li>4. ACS catalysis</li> <li>5. ChemCatChem</li> <li>6. Am. Chem. Soc.</li> <li>7. Chem. Intern. Ed.</li> <li>8. Phys. Chem.</li> <li>9. Science</li> <li>10. Cat.</li> </ol>
<b>Method of evaluation</b>	<b>100.00%</b> - Final exam
<b>Nature of the assignments</b>	<b>RECOMMENDED TEXTBOOK:</b> Didier Astruc “Organometallic Chemistry”
<b>Course Policies</b>	HOMEWORK: Special topic reading assignments EXAMS: Final: May 2017 (individual projects – report and oral exam): 100% No make-up exams will be provided.

### Tentative Course Schedule

*(Time, topic/emphasis & resources)*

Week	Lectures	Topic
1	Sun 01/22/2017 Wed 01/25/2017	no class
2	Sun 01/29/2017 Wed 02/01/2017	1. <b>General Objectives of the course</b> 2. 18 electrons rule, pi bonding
3	Sun 02/05/2017 Wed 02/08/2017	Sigma bonding Organometallic chemistry and catalysis: Ligand
4	Sun 02/12/2017 Wed 02/15/2017	Elementary steps in catalysis : sigma bond metathesis
5	Sun 02/19/2017 Wed 02/22/2017	Elementary steps in catalysis: Insertions reactions, beta elimination
6	Sun 02/26/2017 Wed 03/01/2017	Short introduction to catalytic cycle
7	Sun 03/05/2017 Wed 03/08/2017	Homogeneous catalysis: Carbonylation
8	Sun 03/12/2017 Wed 03/15/2017	Homogeneous catalysis : Hydroformylation
9	Sun 03/19/2017 Wed 03/22/2017	Homogeneous catalysis: Monoelectronic transfer
10	Sun 03/26/2017 Wed 03/29/2017	Polymerization: olefins, dienes,...
11	Sun 04/02/2017 Wed 04/05/2017	Heterogeneous catalysis: the various classes of catalysts
12	Sun 04/09/2017 Wed 04/12/2017	Heterogeneous catalysis: the flue gas depollution
13	Sun 04/16/2017 Wed 04/19/2017	Heterogeneous Catalysis: Energy and CO <sub>2</sub>
14	Sun 04/23/2017 Wed 04/26/2017	Heterogeneous Catalysis: Deactivation and regeneration
15	Sun 04/30/2017 Wed 05/03/2017	Heterogeneous catalysis: Refining technology
16	Sun 05/07/2017 Wed 05/10/2017	Heterogeneous catalysis:
17	Sun 05/14/2017 Wed 05/17/2017	Heterogeneous catalysis: Refining technology
18		Heterogeneous catalysis:

#### Note

The instructor reserves the right to make changes to this syllabus as necessary.